INFORMATION KIT
re
OFFICIAL OPENING
CANADIAN STEEL WHEEL LIMITED
PLANT

June 17, 1959

OFFICIAL OPENING

of

CANADIAN STEEL WHEEL LIMITED

1900 Dickson Street

Montreal 5, Canada

This Information Kit contains general stories regarding the C.S.W. Plant, as well as a number of more technical items which may be of interest to certain trade and technical publications.

If any editor or reporter wishes specific photographs or illustrations, please let us know and we will make every effort to comply. We suggest you check the range of photographs available from either the accompanying Brochure or the Display Board located in the Machine Shop, at the end of the Plant Tour.

RONALDS ADVERTISING AGENCY LIMITED,
Keefer Building,
1440 St. Catherine St. West,
Montreal, Canada.

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N E W S   S T O R Y   O F   O F F I C I A L   O P E N I N G

(ADVANCE FOR RELEASE
JUNE 17, 1959, AFTER 12 NOON)

Re: Official Opening
CANADIAN STEEL WHEEL LIMITED PLANT

P. M. DUPLESSIS OPENS WORLD'S MOST FULLY AUTOMATED STEEL WHEEL PLANT

C. S. W. Introduces New Industry To Canada

Montreal, June 17th: The Honourable Maurice Duplessis, Prime Minister of the Province of Quebec, today pressed a button which set in motion the operations of the world's most fully automated steel wheel plant. He was officiating at the opening ceremony of Canadian Steel Wheel's new $12,000,000 plant which is situated in the east end of Montreal. The ceremony was performed in the presence of more than a hundred Canadian notables including Senior Government Officers, Senior Railway Executives, and a number of leaders from other industries.

When he pressed the button, Quebec's Prime Minister was standing in one of the glass-enclosed and air-conditioned control booths from which most of the plant's intricate operations are regulated. Spread out below him was a unique measure of man's ever-increasing mastery of technological and industrial power ... power which the men of Canadian Steel Wheel have,

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quite literally, at their fingertips.

It is power, controlled by no more than a push button, which can snap in pieces a steel ingot of 17" diameter as easily as a man snaps a matchstick. This ingot-breaker is unique in Canada.

It is power which is manifested in another part of the plant where the slight exertion of pressing another button can bring into service a forging press which will convert the original fingerweight touch into a force of 6,000 tons.

Automation Dominant Feature

Throughout the plant the dominant feature is the use of automation. In the wheel rolling mill, for instance, the complete operation is controlled from specially-designed consoles located in glass-enclosed control booths, air-conditioned to ensure that fatigue of operators is reduced to a minimum.

The same applies to the three, 90-foot-long, heat treatment furnaces. Here the mechanical cycling of the furnaces is unique in that it is fully automatic. Each of the three separate cycles can be selected by pressing a button in the type of control booth already mentioned. In this phase of the operation a closed circuit industrial television unit has been installed to enable the operator, 135 feet away from the job, to observe the back of the furnaces.

In the 60-foot diameter rotary hearth furnace ... capable of

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heating to forging temperature 348 blocks of steel weighing as much as 240 tons ... there is a control system which shows the operator the moment by moment location of each block in the furnace. In this forging and rolling shop the highly mechanized handling equipment, all designed especially for this plant, enables the entire operation to be carried out by seven men, who can produce an average of 60 wrought steel wheels an hour.

Wheels Pass Strictest Tests

At the end of the process, to ensure that all wheels meet the rigid requirements of the railways, every wheel passes through a high-powered magnetic crack detection unit fitted with black light to permit rapid identification of even the most minute cracks. In addition all diesel and heavy duty wheels are tested supersonically to ensure that none are shipped with internal flaws.

White Coat Workers

In most people's minds workers in giant plants such as the new C.S.W. operation are usually pictured as men in dirty overalls, grimy-faced and muscular. At C.S.W., industry has attained such a level of mechanization and specialization that almost every operator performs his job dressed in a white coat. This significant change in appearance highlights the emergence of the worker in heavy industry out of a menial level of labour into one where he is a specialist who can leave the drudgery of heavy labour to the ingenious machines he controls.

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Site Once River Bed

From the beginning, construction on the site chosen for the plant was a challenge to both designers and contractors. Where the C.S.W. plant now stands was once the bed of the St. Lawrence River. The plant's foundation had to be laid in soft blue clay, 25 feet deep, with the water table only 2 feet below ground level.

In order to provide support for the buildings and foundations for equipment weighing over 4,000 tons, it was necessary to take the exceptional measure of driving 910 steel and concrete piles to depths of 28 feet. Some other interesting statistics relating to the plant are as follows: 133 miles of electrical wire were used in 14 miles of conduit to service the highly automated equipment; 1,882 tons of structural steel were used in the building structure which contains 158,732 sq. feet of floor area; total land area 23 acres; ten miles of hydraulic steam and air piping; cost of building $2½ million; cost of equipment $9½ million; number of employees, at full capacity, 175.

Change From Cast Iron To Steel Creates Need

Greater loads, higher travelling speeds of railway freight and passenger services have caused the railways in North America to change from cast iron wheels to wrought steel. This need was further spurred by an American Association of Railways ruling that, beginning January 1st, 1958, all railway cars - passenger, diesel and freight - will have to use rolled or cast steel wheels for new and rebuilt equipment.

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This ruling increased, sharply and suddenly, the Canadian market for steel wheels in Canada. As a result, a group of far-sighted business men was quick to seize the opportunity to introduce a new industry into Canada. It required international collaboration to form the new company, the two parent companies being English Steel Corporation, Sheffield, and Canadian Steel Foundries Limited, Montreal.

Prior to the construction of the C. S. W. plant, almost all rolled steel wheels used in Canada were imported from England, the greater part of them having been manufactured by Taylor Bros. & Co. Ltd., whose services have been retained as technical aid. Canadian Steel Foundries Limited is a member of the A. V. Roe Canada Group. English Steel Corporation is a member of the Vickers Group.

Highly Experienced Staff Heads C.S.W.

Gordon L. McMillin, President of C.S.W., heads a staff of specialists who are all exceptionally well qualified. Mr. McMillin himself has had over 30 years' experience in the steel industry. Starting as Chemist Metallurgist with the Chicago Steel Foundry in 1927, he moved on to be Chief Metallurgist in 1932 and until 1954, when he joined the Steel Foundry Division of Canadian Car and Foundry Limited, he had wide experience with various U. S. companies as Works Metallurgist and finally as Works Manager with General Steel Castings Corp., Granite City, Illinois. In 1955 he was appointed Vice-President of what is now known as Canadian Steel Foundries Limited, and in 1956 became Vice-President and General

Manager. During this period he directed the production of the largest castings ever produced by a foundry in Canada. In 1958 he was elected President and General Manager of C.S.F. His election as President of C.S.W. was announced later the same year. In April 1959, Mr. McMillin was elected a Director of Canadian Car Company Limited.

The General Manager of the new C.S.W. plant, Eric J. White, came to the company from Taylor Bros. & Co. Ltd. in England, where he was for some time Assistant Works Manager of all manufacturing processes. Thereafter Mr. White directed, on behalf of Taylor Bros. the engineering and development work needed to establish a wheel and axle machinery and assembly plant in Johannesburg, South Africa. He later performed a similar function for a wheel mill installation for Armco Steel Corporation in Pennsylvania. On formation of Canadian Steel Wheel, he was appointed Project Manager and on completion of the development project he resigned from Taylor Bros. to accept appointment as General Manager of Canadian Steel Wheel Limited.

(END ADVANCE FOR RELEASE WEDNESDAY, JUNE 17, 1959 AFTER 12 NOON)

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(Lead-in for other than newspaper use)

WORLD'S MOST FULLY AUTOMATED
STEEL WHEEL PLANT OPENED IN
MONTREAL

Canadian Steel Wheel Limited Introduces New Industry To Canada

Montreal, June 17th - The world's most fully automated steel wheel plant was opened today in Montreal. Officiating at this inauguration was the Province of Quebec's Prime Minister, The Honourable Maurice Duplessis. The ceremony of opening Canadian Steel Wheel's new $12,000,000 plant was performed in the presence of more than a hundred Canadian notables, including Senior Government Officers, Senior Railway Executives, and a number of leaders from other industries.

When Prime Minister Duplessis pressed the button which set certain sections of the plant's machinery in operation, he was standing in one of the glass-enclosed and air-conditioned control booths from which most of the plant's intricate operations are regulated. Spread out below him was a unique measure of man's ever increasing technological and industrial power ... power which the men of Canadian Steel Wheel Limited have, quite literally, at their fingertips.

(Story continues on from paragraph 3 of previous news release)

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WELCOMING SPEECH OF G. L. McMILLIN,
PRESIDENT, C.S.W.

Mr. Prime Minister, Mr. Mayor, honoured guests
and colleagues:

As a man whose life is now centered around the production of wheels, I must admit to the pleasure of finding myself today in the most excellent company - the company of some of the "biggest wheels" in this progressive province.

Thank you for being here. In a moment it will be my honour to ask Prime Minister Duplessis to push the button which will officially start wheels rolling out of this plant at the attainable rate of 200,000 a year. But before I do that, I would like to outline the reasons for this new industry coming into being in Canada.

For years it has been said that "necessity is the mother of invention". I would like to take the liberty of suggesting that "necessity is the mother of progress".

Because this is the most fully automated plant of its kind in the world - we feel we deal here in railway progress and, in this case, the motivating necessity was the need for wheels for rolling stock that would stand the ever-increasing speeds and loads called for in today's railroad operations.

Hence ... wrought steel wheels to replace the old cast iron

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ones ... and therefore this plant to construct them.

Now, that statement takes it for granted that you will believe the implied suggestion that steel wheels will serve the railroads better than cast iron ones.

Adam probably took it for granted that the apple Eve offered him was just an ordinary apple, and because he took it for granted he's been in trouble ever since! So bear with me while I point out that the first function of a wheel is to roll, and any failure in that function can lead, on the railroads, to excess maintenance, disaster and possible loss of life.

Extreme variations of temperature, the massive hauls undertaken by diesel locomotives and their speed of acceleration impose tremendous thermal and mechanical loads on the wheels. It is, therefore, of vital importance to the railroads that the strength of the wheels and their manufacture and inspection should be maintained at the highest level it is possible to achieve. Only wrought steel wheels give the needed strength and offer the producer the possibility of maintaining quality controls at top levels.

Later, when you tour the plant, you will see how the strictest controls are maintained by such instruments as the magnetic crack detection unit and the supersonic tester.

Now, another point that I would like to make is that in bringing this plant into production we have done the apparently impossible - we

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have brought a somewhat lusty infant to birth which has every faculty fully developed. This prodigy has been achieved because of our distinguished relationship to the Canadian Steel Foundries, of the A.V. Roe group, and English Steel, of the Vickers group ... and because of the direct relationship we have with Taylor Bros. & Co. Ltd. of Manchester, England, probably the oldest and most experienced company in existence in the manufacture of steel wheels. To their expert guidance we offer thanks with sincere gratitude.

In the development and design of this plant we have approached many of our problems with a fresh mind - open to take in the ideas of today and to discard those of yesterday. Thus we can keep our thinking sharply in perspective and able to meet new problems whenever they arise ... problems of railway transportation, for instance, like those which Canada's expanding economy are presenting even now.

Canada's economic strength is mostly in her immense reserves of valuable mineral ores and other natural resources. Unfortunately, most of them are at great distances from the centres where they will be processed.

So this country's golden future will be built, as was its past, largely on the foundations for which the nation's active and progressive railway companies have been responsible.

At Canadian Steel Wheel we are proud to think that we are now in a position to contribute a very real share to the railways' continuing

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enterprise and to their future. This plant, therefore, has come into being not only to meet present needs, but with a long look to that future.

Canada's economic progress will and must roll forward. We have planned, so far as the railways are concerned, that the wheels of that progress will be built here, in the Province of Quebec, by Canadian Steel Wheel Limited.

Finally, let me say that in siting this plant in the Province of Quebec, I feel we have made an excellent choice. This province is in many ways setting the pace for the nation's industrial development. Economically, in the past few years, its progress has been phenomenal. And again I must say that we are proud ... this time because we feel that from now on we shall be playing an increasingly useful part in that progress.

Now it is my honour and pleasure to introduce the man who has, more than anyone else, been the architect of this thriving province's industrial expansion ... The Honourable Maurice Duplessis, Prime Minister of the Province of Quebec.

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LIST OF GUESTS INVITED TO OFFICIAL OPENING

QUEBEC PROVINCIAL GOVERNMENT - Parliament Building, Quebec City, Quebec.

The Hon.Paul Beaulieu	Minister of Industry and Commerce
The Hon.Antoine Rivard	Minister of Transport & Communications and Solicitor General
The Hon.Maurice Duplessis	Premier of Quebec

CITY OF MONTREAL - City Hall, Montreal, Quebec.

The Hon.Sarto Fournier	Mayor of Montreal

ALPHABETICAL COMPANY LISTING

ALGOMA CENTRAL & HUDSON BAY RAILWAY CO. - Sault Ste. Marie, Ontario.

E.B. Barber	President
W.M. Hugill	Executive Assistant to the President

ALGOMA STEEL CORPORATION, LIMITED - Sault Ste. Marie, Ontario.

D.S. Holbrook	President
Carson Weeks	Vice President - Sales

ALUMINUM COMPANY OF CANADA LIMITED - Sun Life Building, Dominion Square, Montreal, Que.

Fraser W. Bruce	President
L.C. Wellington	Chief Purchasing Agent

BAKER, JOHN, & BESSEMER CO. LTD. - Kilnhurst Steel Works, Nr.Rotherham, Englan

Bernard Baker

... more/

BANK OF MONTREAL - 119 St. James Street West, Montreal, Que.

G.A.R. Hart	President
J.L. Walker	Manager, Main Branch

BANK OF NOVA SCOTIA - 437 St. James Street West, Montreal, Que.

A.L. Ormiston	Quebec Supervisor

BOARD OF TRANSPORT COMMISSIONERS FOR CANADA - Union Station, Ottawa, Ont.

R. Kerr, Q.C.	Chief Commissioner

CANADA IRON FOUNDRIES LIMITED - Sun Life Building, Montreal, Que.

T.F. Rahilly	President

CANADA STEAMSHIP LINES LIMITED - P.O. Box 100, Montreal, Que.

T.R. McLagan	President

CANADAIR LIMITED - P.O. Box 6087, Montreal, Que.

J.G. Notman	President

CANADIAN BANK OF COMMERCE - 265 St. James Street West, Montreal, Que.

R.E. Harrison	Assistant General Manager

CANADIAN CAR COMPANY LIMITED - P.O. Box 160, Montreal, Que.

E.J. Cosford	Chairman of the Board
S.G. Harwood	President & Managing Director
E.W. Johnson	Manager, Railroad Equipment Sales

CANADIAN GENERAL TRANSIT CO. LTD. - 550 Sherbrooke St. West, Montreal

C.H. Drury	President

... more/

CANADIAN IMPORT COMPANY - 5250 Western Avenue, Montreal, Que.

C.W. Webster	President

CANADIAN LOCOMOTIVE CO. LTD. - Kingston, Ontario

R.H. Morse, Jr.	President
G.O. Saunders	Executive Vice President

CANADIAN MANUFACTURERS ASSOCIATION - 1255 University Street, Montreal, Que.

M.S. Layton	Chairman - Montreal District

CANADIAN NATIONAL RAILWAYS - 360 McGill Street, Montreal, Que.

E.A. Bromley	Vice President - Purchases and Stores
S.F. Dingle	Vice President - Operation
Donald Gordon	Chairman and President
N.J. MacMillan, Q.C.	Executive Vice President
P.L. Mathewson	Asst. Chief of Motive Power & Car Equipment
M.A. Metcalf	Vice President - Traffic
T.M. Pye	General Purchasing Agent
Dr. O.M. Solandt	Vice President - Research & Development
W.R. Wright	Director of Public Relations
E. Wynne	Chief of Motive Power & Car Equipment

CANADIAN PACIFIC RAILWAY COMPANY - Windsor Station, Montreal, Que.

G.H. Baillie	Vice President - Operations
R.C. Barnstead	Manager - Department of Research
G.F. Buckingham	Vice President - Traffic
N.R. Crump	President

... more/

CANADIAN PACIFIC RAILWAY COMPANY (Continued)

W.D. Dickie	Asst. Chief of Motive Power & Rolling Stock
T.A. Donovan	General Purchasing Agent
R.A. Emerson	Vice President
L.B. George	Chief of Motive Power & Rolling Stock
W.A. Mather	Chairman
H.P. Millar	Vice President - Purchases & Stores
D.B. Wallace	Manager, Department of Public Relations

CANADIAN STEEL WHEEL LIMITED - Officers and Directors

F.S. Beale	Director, c/o English Steel Corp., Ltd., River Don Works, Sheffield 9, England.
J. Bedbrooke	Director, c/o Holden Company Limited, 614 St. James Street West, Montreal, Que.
E.G. Burgess	Director, P.O. Box 160, Montreal, Que.
D.N. Byers	Secretary, c/o P.O. Box 507, Place d'Armes, Montreal, Que.
J.E. Clubb	Vice President - Finance, c/o P.O. Box 249, Montreal, Que.
A.C. MacDonald	Director, c/o P.O. Box 160, Montreal, Que.
E.F. Neale	Executive Vice President, c/o Holden Co. Ltd. 614 St. James Street West, Montreal, Que.
R.G.H. Taylor	Chairman, c/o Taylor Bros. & Co. Ltd.,Trafford Park Steel Works, Manchester 17, England.

CANADIAN VICKERS LIMITED -

R.C. Pearse	President, P.O.Box 550, Place d'Armes,Montreal
J.B. Lewis Forbes	Director, Brockhills House, Sway Rd., New Milton, Hants, England.

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CANADIAN VICKERS LIMITED (Continued)

J.E. Richardson	Director, P.O. Box 550, Place d'Armes,Montreal.
R.K. Thoman	Vice President - Engineering Division, P.O. Box 550, Place d'Armes, Montreal, Que.
Major-Gen.A.E.Walford	Chairman, P.O.Box 550, Place d'armes, Montreal.

CHAMBRE DE COMMERCE DISTRICT DE LA PROVINCE DE QUEBEC - 330 Craig St.East,Montreal.

René Paré	President

DOMINION ENGINEERING COMPANY LIMITED - P.O. Box 220, Montreal, Que.

H.G. Welsford	President and Managing Director

DOMINION STEEL AND COAL CORPORATION, LIMITED - 624 Canada Cement Bldg., Montreal.

R.E. Cromwell	General Solicitor
A.L. Fairley, Jr.	President
T.H. McEvoy	Vice President - Steel Sales
C.R. Snell	Vice President - Purchasing

DRUMMOND McCALL & CO. LTD. - 930 Wellington Street, Montreal, Que.

Alan McCall	President

ENGLISH STEEL CORPORATION LIMITED - River Don Works, Sheffield 9, England.

Sir Frederick Pickworth	Chairman
W.D. Pugh	Managing Director

GENERAL MOTORS DIESEL LTD. - London, Ontario.

C.P. Morrison	Purchasing Agent
E.V. Rippingille, Jr.	President
W.M. Warner	General Sales Manager

... more/

<u>GENERAL STEEL CASTINGS CORPORATION</u> - Granite City, Illinois.

C.P. Whitehead	President

<u>GLOVER ASSOCIATES (CANADA) LIMITED</u> - 1425 Mountain Street, Montreal, Que.

B.W. Glover	

<u>HAWKER SIDDELEY GROUP LIMITED</u> - 18 St. James's Square, London S.W.1, England.

Sir Roy Dobson	Managing Director

<u>HOLDEN COMPANY LIMITED</u> - 614 St. James Street West, Montreal, Que.

B.H. Ferguson	Chairman
R.S. Wilson	Vice President

<u>HYDRO QUEBEC</u> - 107 Craig Street West, Montreal, Quebec.

J.A. Savoie	Chairman

<u>KENDALL CONTRACTING INC.</u> - 1094 North Union Ave., Alliance, Ohio.

E. Homer Kendall	President

<u>MARINE INDUSTRIES LTD.</u> - Sorel, Quebec.

L. Simard	President

<u>MONTREAL BOARD OF TRADE</u> - 300 St. Sacrament Street, Montreal, Que.

E.R. Alexander	President

<u>MONTREAL LOCOMOTIVE WORKS</u> - 1505 Dickson Street, Montreal, Quebec.

D.W. Cameron	Vice President - Manufacturing
W. Miller	President
H.J. Purcell	Material Procurement Manager
H. Vallee	Manager of Marketing

... more/

MONTREAL STEEL & FOUNDRY WORKERS UNION - 5227 Notre Dame Street East,Montreal,Que

Harry Mockeridge	President

NATIONAL HARBOURS BOARD - 357 Common Street, Montreal, Quebec.

Brig.Maurice Archer	Chairman

NATIONAL STEEL CAR CORPORATION LIMITED

J.N. Baird	Vice President - Sales, 620 St. James St.West, Montreal, Quebec.
H.S. Lang	President, Kenilworth Ave.N., Hamilton, Ont.
A.P. Sherwood	Chairman of the Board, 620 St. James St. W., Montreal, Quebec.

ONTARIO NORTHLAND RAILWAY - North Bay, Ontario.

A. Jardine	General Manager
Col. C.E. Reynolds	Chairman

PACIFIC GREAT EASTERN RAILWAY COMPANY - 1095 West Bender Street, Vancouver, B.C.

W.A.C. Bennett	President
J.S. Broadbent	General Manager
E.M. Gunderson	Executive Vice President

PHILIPS ELECTRONICS INDUSTRIES LTD. - 8525 Decarie Blvd., Montreal, Que.

Rosaire Messier	Chairman of the Board

PRICE WATERHOUSE & CO. - 606 Cathcart Street, Montreal, Quebec.

John Church

... more/

<u>QUEBEC CARTIER MINING COMPANY</u> - 1255 Laird Blvd., Montreal, Quebec.

L. Severson	President
G. Squibb	Asst. Chief Engineer - Transportation
H.S. Webster	Director of Purchasing

<u>QUEBEC NORTH SHORE & LABRADOR RAILWAY CO.</u> - 810 Cote de Liesse Road, Montreal,Que.

W.H. Durrell	Vice President
W. George	General Purchasing Agent
J.A. Little	General Manager (Seven Islands)
C.E. McManus	Vice President
J.R. Timmins	President, Royal Bank Building, 360 St.James St. W., Montreal, Quebec.

<u>ROBERVAL & SAGUENAY RAILWAY COMPANY</u> - Arvida, Quebec.

J.B. White	President

<u>A.V. ROE CANADA LIMITED</u> - 170 University Avenue, Toronto, Ontario.

A.A. Bailie	Vice President (Finance) & Treasurer
Air Marshal W. A. Curtis	Director
Crawford Gordon	President
F.T. Smye	Executive Vice President - Aeronautical
J.S.D. Tory	Director

<u>ROSS, TOUCHE & CO.</u> - 360 St. James Street West, Montreal, Quebec.

H.I. Ross, C.A.

... more

ROYAL BANK OF CANADA - 360 St. James Street West, Montreal, Quebec.

W.D.H. Gardiner	Manager - Main Branch
K.M. Sedgewick	General Manager

STEEL COMPANY OF CANADA LIMITED - 525 Dominion Street, Montreal, Quebec.

L.T. Craig	Vice President
V.W. Scully	President

TAYLOR BROS. & CO. LTD. - Trafford Park Steel Works, Manchester 17, England.

James Cartwright	Works Manager
Charles Dunt	Business Manager

TORONTO HAMILTON & BUFFALO RAILWAY - Hamilton, Ontario.

A.S. Coombs	Purchasing Agent
P.W. Hankinson	General Manager

TORONTO TRANSIT COMMISSION - 1900 Yonge Street, Toronto, Ontario.

Len Bardsley	Superintendent - Electrical Equipment
A.V. Davidge	Purchasing Agent
W.E.P. Duncan	Manager of Operation
R.V.H. Howe	Director of Materials
John G. Inglis	General Manager

UNITED KINGDOM TRADE COMMISSIONER - 56 Sparks Street, Ottawa, Ontario.

K. McGregor

UNITED STEEL CORPORATION LIMITED - 8-10 Grosvenor Gardens, London S.W.1,England.

A.H. Peech	Managing Director, Steel Peech & Tozer

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VICKERS-ARMSTRONGS LIMITED - Vickers House, Broadway, Westminster, London S.W.1, England.

Major General Sir Charles Dunphie, C.B., C.B.E., D.S.O.	Managing-Director
The Viscount Knollys, G.C.M.G., M.B.E., D.F.C.	Chairman

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Story on souvenir wheel

All guests attending the Official Opening of Canadian Steel Wheel Limited are being presented with a novel souvenir - an ashtray in the form of a railway wheel.

Dimensions are true to scale, except for one measurement. The wheel hub had to be enlarged, designers at C.S.W. discovered, in order to provide a solid base to the ashtray and to prevent tipping.

The bright-silver polished chrome surface of this souvenir makes it a welcome addition to the desk accessories of any executive. This wheel-ashtray, 6 inches in diameter, is big enough to accommodate even king-size cigarettes.

Strangely enough, Canadian Steel Wheel engineers discovered that they were unable to produce this miniature railway wheel in their own Plant, despite their huge productive capacity of 200,000 units per year. The reason: the souvenir wheel was too small for the giant machines at C.S.W.

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Story on the men in the white coats

The man in the white coat at Canadian Steel Wheel Limited may look like a surgeon. In reality he is one of 175 specialists employed at C.S.W. in the production of steel and railway steel wheels.

The white coats are their outward sign of all that is unique about this Plant - recognized as the most fully automated plant of its kind in the world.

As a result of automation and the application of electronics to handling equipment, the mark of distinction of the men in this Plant need not be grimy overalls plus muscle and brawn. Their spotless white coats point up the fact that man, in his industrial wisdom, has come of age - has, indeed, harnessed the full power of machinery the better to serve him.

The man in the white coat at C.S.W. recognizes this in his everyday work motions. Sitting in his glass-enclosed and air-conditioned control booth, he scans the array of dials before him, leans forward every so often to push a button, pull a handle, or adjust a knob. At his inspection station the man in the white coat may be intent on reading the significant green lines on the oscilloscope. This is a production-line inspection stage which tests every wheel supersonically to detect even the most minute flaws - one of many inspection and quality control procedures at C.S.W.

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All of this has been made possible by farsighted planning and engineering, by careful selection of men for their special aptitudes, and by a financial investment of $12,000,000.

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FACTS IN BRIEF

Plant Designers and Consultants	- Kendall Engineering Co., Alliance, Ohio.
General Contractors	- Angus Robertson Limited, Montreal, Quebec.
Mechanical and Electrical Equipment Installation	- Canadian Comstock Ltd., Montreal, Quebec.
Ground broken:	July 31, 1957
Steel commenced:	November, 1957
Steel erection completed:	July, 1958
Building completed:	September, 1958
Land area:	23 acres
Height of building:	70 feet
Gross floor space:	160,000 square feet
Structural steel:	4,000 tons (approximately)
Cost of building:	\$2½ million
Cost of equipment and installation:	\$9½ million
Total cost of Plant:	\$12 million
Number of employees:	175 (at full capacity)
Electrical wire and cable:	133 miles
Hydraulic steam and air piping:	10 miles
Total weight of equipment installed:	4,000 tons
Heaviest piece of machinery:	500 tons
Heaviest individual piece handled:	110 tons

# # #

List of Officers and Directors

Directors	Officers		
F. S. Beale	R. G. H. Taylor	-	Chairman
J. W. Bedbrooke	G. L. McMillin	-	President
E. G. Burgess	E. F. Neale	-	Exec. V.P.
J. E. Clubb	E. J. White	-	Gen. Mgr.
A. C. MacDonald	J. E. Clubb	-	V.P. - Finance
G. L. McMillin	G. A. Gowdy	-	Treasurer
E. F. Neale	D. N. Byers, QC	-	Secretary
R. G. H. Taylor			

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Product List

Canadian Steel Wheel Limited produces railway steel wheels - for freight cars, passenger cars and diesel locomotives - with a diameter of from 24" to 50", and weighing up to 2,000 pounds each.

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Story on the need for C.S.W.

With the new Canadian Steel Wheel Plant in Montreal capable of producing 200,000 wrought steel wheels per year for Canada's railways, it's a fair question to ask why so many wheels will be needed.

The answer lies partly in the fact that Canada's railways can look forward to further growth, but mainly in the fact that until quite recently Canadian railway cars were using cast iron wheels. In recent years, greater and greater loads and higher and higher travelling speeds forced the railways to consider the use of steel wheels.

Then came a firm ruling from the American Association of Railways, the organization which sets the industry's standards in North America, that beginning January 1st, 1958, all railway cars - passenger, diesel, freight - will have to use steel wheels, rolled or cast, for both new and rebuilt equipment.

This ruling served to increase sharply and suddenly the market in Canada for steel wheels, and a group of farsighted businessmen was quick to seize the opportunity to introduce a new industry into Canada. It required international collaboration to form the new company, the two parent companies being English Steel Corporation, Sheffield, and Canadian Steel Foundries Limited, Montreal.

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Prior to the construction of the C.S.W. Plant, practically all rolled steel railroad wheels used in Canada were imported from England, and a large proportion of these was manufactured by Taylor Bros. & Co. Ltd., Manchester. C.S.W. is able to draw on the vast experience of Taylor Bros. through an arrangement to retain that company's services as technical aid.

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Story on how C.S.W. makes a steel wheel

Steel Melting Shop

To provide the high-quality steel necessary for the manufacture of wrought steel wheels, the melting shop is equipped with two 16-ft. diameter, 45-ton capacity, electric arc melting furnaces. Power for each furnace is supplied by a transformer having a capacity of 17,500 KVA, the largest transformer ever installed on this size of furnace.

Steel scrap for the furnace charge is brought in by rail and stored in a building adjacent to the furnace. This scrap is subsequently loaded by magnet into a 40-ton capacity charging bucket and transported to the melting shop by a special rail car fitted with an electronic weigh scales - the only one of its kind in Canada.

A well-equipped laboratory, situated adjacent to the furnace, enables metallurgical chemists to keep a constant check on the analysis of the steel as it is melted.

The molten metal is poured into a 50-ton capacity ladle and transferred by a 75-ton overhead crane to an ingot pouring car. This car traverses the ladle over moulds set in a pit and the metal is teemed down centre runners and up into clusters of five or six moulds. The ingots vary in weight from one to three

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tons and the analysis is strictly controlled to meet the requirements of the railway companies' specifications.

After a strictly regulated period of time, the ingots are stripped from the moulds and transferred to the Ingot Breaking Shop.

Ingot Breaking Shop

In this shop, ingots are broken into either three or four blocks, according to the weight required to produce the various types of wheels. A conveyor system, incorporating scales for weighing the blocks, transfers the blocks either into storage or to the rotary hearth furnace in the Wheel Forging and Rolling Shop.

Ingots are broken in a machine, unique in Canada, and of which there are only two others in the world. This machine, of the mechanical reciprocating type, is driven by a 100 H.P. motor and can break 17" diameter ingots as easily as snapping a matchstick.

Forging and Rolling

The Forging and Rolling Shop is capable of producing an average of 60 wrought steel wheels an hour, and a feature of the sequence of operations is that a permanent record is maintained of the product throughout each stage of manufacture, from ingot to finished wheel.

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Highly-mechanized handling equipment, all designed especially for this Plant, eliminates many of the problems caused by human error and enables the entire forging and rolling operation to be controlled by only 7 operators. The forging and rolling operations are so rapid, taking only 2 to 3 minutes, that it is possible to complete the whole cycle in a single heating of the block with no reheating required.

Blocks are heated to forging temperature in a rotary hearth furnace, 60 feet in diameter, and capable of heating 40 tons of blocks an hour. In order to control the rate of heating, the furnace is divided into six zones in which temperature and furnace conditions are automatically controlled. The blocks are carried through the heating zones on the rotating hearth until the final zone is reached where the blocks are soaked to forging temperature.

An indicator dial connected to the furnace hearth shows the number and location of blocks - up to 348 - in the furnace, and a further record is maintained by the operator as part of the product control system.

Automatic charging and discharging machines handle blocks in and out of the furnace, and a feature of their control system is that the loading pattern on the furnace hearth can be varied to enable experiments to be carried out with various heating cycles.

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The discharging machine which removes blocks from this furnace to meet the requirements of the Forging and Rolling Shop, swings the blocks through an arc of 90°, passing them through an hydraulic descaler and depositing them on the lower slabbing die of the 6,000-ton forging press.

The hydraulic descaler projects jets of high-pressure water onto the blocks to remove any furnace scale which would be detrimental to the product.

On the forging press, the block is first reduced to a flat disc between slabbing tools and then transferred by sliding tables to the forming dies. These dies form the hub and part of the web of the wheel, and displace metal to the rim to permit the rolling mill to complete the wheel.

Roller tables automatically remove the forged blank from the press and transfer it to a 1,000-ton punch press, where the blank is rigidly clamped and a hole punched to the required size. On completion of the punching operation, the blank is again transferred on roller tables to a loading mechanism which removes it from the tables into the mill.

The wheel rolling mill, of the horizontal type, forms the finished profile of the rim of the wheel and in doing so spins metal from the rim into the plate and permits the wheel to grow to the required size. This mill has two edging rolls and a back roll, each driven by separate electric motors and, in addition, two

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pressure and two guide rolls mounted in separate sliding carriages. A special feature of the mill is the application of electronics to the screwdown to permit the rolling of a taper web.

When rolling has been completed, a specially-designed machine removes the wheel from the mill and deposits it on the lower die of the 3,000-ton coning press. This press, of a special design, displaces the hub axially and cones the plate so that the wheel is now formed to its finished profile.

A sliding table transfers the completed wheel from under the press to a transfer mechanism which turns the wheel over and at the same time lifts it to an elevated conveyor. This conveyor carries the wheel first through a stamping press, which stamps identification markings on the rim, and then through an inspection unit where each wheel is gauged.

All these operations are controlled from specially-designed consoles located in glass-enclosed control booths, air-conditioned to ensure that fatigue of operators is reduced to a minimum.

A large quantity of water is required for the cooling of dies and rolls, and special arrangements have been made to filter and remove contamination from the water before it is deposited into the sewers.

<u>Heat Treatment</u>

After leaving the Forging and Rolling Shop, the wheels are

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transferred by roller conveyor to the heat treatment furnaces. There they are loaded by overhead manipulator cranes onto cars for transfer into the first furnace.

Three car-type heat treatment furnaces, each nearly 90 feet long, are fired by light fuel oil and are designed to give flexibility in heat treatment cycles. The mechanical cycling of the furnace is unique in that it is fully automatic, and three separate cycles can be selected by pushing selector buttons. The complete cycle is controlled by an operator from another glass-enclosed control booth in the front of the furnaces and, to enable him to observe the back of the furnaces, a closed circuit industrial television unit has been installed.

Heavily-loaded wheels used on diesel locomotives, passenger cars or heavy freight cars, are hardened on the treads by quenching in water. This is accomplished in four specially-designed units in which jets project water onto the rim of the wheels for a controlled period of time to obtain the specified hardness. After being rim-chilled, the wheels are transferred into the third furnace for the final tempering treatment. One-wear wheels, which form the bulk of the output, are given a heat treatment to remove undesirable stresses and to give a long wearing life.

Wheel Machining and Inspection

When a loaded car leaves the treatment furnaces, it is transferred to a shot blasting unit. There, wheels are unloaded from the

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car and loaded onto an overhead cooling conveyor. This conveyor accumulates wheels until they are cool enough to enter the shot blasting unit and then feeds them through the unit. The purpose of this shot blasting is to remove any mill scale which may still be adhering to the plates of the wheels.

Wheels leaving shot blasting are given a Brinell hardness test if required, and either placed into stock or fed into the wheel machining shop.

Wheel machining is carried out on special purpose high-production transfer units capable of machining forty wheels an hour. Four vertical boring and turning mills perform the special machining required on certain types of wheels.

To ensure that all wheels meet the rigid requirements of the railways, every wheel passes through a high-powered magnetic crack detection unit fitted with black light to permit rapid identification of even the tiniest of cracks. All diesel and heavy-duty wheels will, in addition, be supersonically tested to ensure that none are shipped with internal flaws.

Visual examination and dimensional inspection by railway company inspectors are carried out before the wheels are finally shipped to their destinations.

Power House

To provide power for the Forging and Rolling Shop, a high-pressure

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hydraulic system incorporating four 500 H.P. hydraulic pumps, with associated air accumulators having an operating pressure of 4,200 lbs. per sq. inch, has been installed. These pumps are automatically controlled and supply high-pressure water to the forging presses.

A 1,500 H.P. generator, with associated electrical control equipment, supplies the power to the rolling mill, and electric control centres supply power to equipment throughout the plant. Auxiliary generators, air compressors and steam boiler complete the equipment in the power house.

Maintenance, Roll & Die Shop

In an automatic plant such as this, it is important that maintenance should be of the highest quality since output can be seriously affected due to failure of a single piece of equipment.

Maintenance organization is therefore very important and a small but well-equipped shop is vital to maintain output and minimize breakdowns.

In this shop, all forging and rolling tools are also machined and inspected, and a constant check is kept on the life of these tools to ensure that materials are used to the best advantage.

# # #

Story on Plant construction problems

PLANT SITE ONCE RIVER BED

From the beginning, conditions on the Plant's site were a challenge to both designers and contractors. Where the C.S.W. plant now stands was once the bed of the St. Lawrence River.

The foundations had to be laid in soft, blue-grey clay, which is 25 feet deep, with the water-table only 2 feet below ground level. In order to provide support for the buildings and foundations for heavy equipment, weighing a total of over 4,000 tons, it was necessary to take the exceptional measure of driving 910 steel and concrete piles to depths up to 28 feet.

Not only was the condition of the terrain difficult, but weather conditions were exceptionally severe during the period of the building's construction. A wet summer and savage winter tried the men on the job severely. Often they had to work in two feet of soft sticky ooze. A 12-ton bulldozer was almost lost in the sea of mud and, when winter struck, the prolonged icy weather made the work of installation of machinery, electrical wiring and piping a particularly difficult job.

In spite of these conditions, the constructing firm, Angus Robertson Co. Ltd., completed its exceptionally difficult task on schedule.

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Some interesting statistics of the project:

14,000 cu. yards of concrete used in the foundations.

The building structure contains 158,732 sq. feet of floor area, almost entirely all at the ground floor level.
133 miles of electrical wire and cable were used in 10 miles of conduit to service the highly automated equipment. A unique power feature is the three 13,000 volt electrical power feeders connected in parallel to the same Bus Bar.

A total of 10,000 cu. yards of concrete were used in the equipment foundations alone, which required 452 steel H. piles driven to rock.

The total weight of equipment installed 4,000 tons

The heaviest piece of machinery weighed 500 tons

The heaviest individual piece handled on the site weighed 110 tons

# # #

Biographical notes on
highly-skilled specialists

Gordon L. McMillin,
President,
Canadian Steel Wheel Limited.

Born in Vermillion Co., Illinois, January 18, 1906.

Education: Brazil High School, Indiana; McKinley High School, Chicago; Lewis Institute and Armour Institute (Illinois Institute of Technology), Chicago. Graduated in 1927 with the degree of Bachelor of Science in Chemical Engineering.

Upon graduation was employed as Chemist Metallurgist by the Chicago Steel Foundry Company, Chicago. In 1936 accepted the position of Chief Metallurgist of the Buckeye Traction Ditcher Co. (now Gar Wood Industries), Findley, Ohio. Moved to Pine Bluff, Arkansas, in 1938, to accept the position of Chief Metallurgist at the Standard Brake Shoe and Foundry Company, Memphis, Tennessee.

In 1942 accepted the position of Works Metallurgist at General Steel Castings Corporation at its Armour Plant, Madison, Illinois, and was very active in the development of armor steel for tanks. Was transferred to the Commonwealth Plant, Granite City, Illinois, in 1944, as Works Metallurgist, and was appointed Works Manager in 1952.

In the latter part of 1954 accepted the position of Assistant

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Vice-President of the Steel Foundry Division, Canadian Car & Foundry Company Limited, Montreal (now known as Canadian Steel Foundries Limited). Was appointed Vice-President in 1955 and, in 1956, Vice-President & General Manager. At Canadian Steel Foundries Mr. McMillin has directed the production of the largest castings ever produced by a foundry in Canada.

In the latter part of 1958 was elected President and General Manager of C.S.F. His election also as President of Canadian Steel Wheel was announced in December, 1958. At C.S.W. he has co-ordinated all phases of administration, construction and installation of the new Plant - the most fully automated wrought steel wheel plant in the world. In April, 1959, was elected a Director of Canadian Car Company Limited.

Mr. McMillin is a member of the Steel Founders' Society of America, Steel Castings Institute of Canada, American Society for Metals, American Institute of Mining and Metallurgical Engineers, American Welding Society, and the Corporation of Professional Engineers. He is also a member of the Mt. Stephen Club, Engineers Club, Montreal Badminton and Squash Club, Marlborough Golf and Country Club, Seigniory Club.

# # #

Eric J. White,
General Manager,
Canadian Steel Wheel Limited.

Born in London, England, March 29, 1915.

Educated in various Colleges in the United Kingdom.

Employed as apprentice in mechanical and electrical engineering by Taylor Bros. & Co. Ltd., Trafford Park Steelworks, Manchester, England. Later, as Assistant Development Engineer, participated in the modernization of machine and assembly shops for railway wheels, as well as in development and installation of the first fully-mechanized wheel forging and rolling plant. On completion of the Plant, was appointed Manager in charge of forging and rolling operations, later became Assistant Works Manager of all manufacturing processes.

Was sent by Taylor Brothers to Johannesburg, South Africa, to direct the engineering and development work needed in establishing a new company there for wheel and axle machining and assembly. Mr. White later acted as Manager there for a period of nine months.

During installation and mechanization of its wheel mill by Armco Steel Corporation, Butler, Pennsylvania, he was appointed advisor in connection with operations and engineering under a Technical Aid Agreement with Taylor Brothers.

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On formation of Canadian Steel Wheel Limited, Montreal, was appointed Project Manager in charge of engineering and installation of the integrated wheel forging and rolling plant. On completion of the development project, November 1, 1958, resigned from Taylor Brothers to accept appointment as General Manager of Canadian Steel Wheel Limited.

Mr. White was formerly Secretary of the Graduate Section of the Institute of Mechanical Engineers, Northwestern Division, and is at present an associate member. While in Manchester, England, Mr. White was lecturer in hydraulics, mechanics, and strength of materials at Salford Royal Technical College.

# # #

Eric T. Jackalin,
Works Manager,
Canadian Steel Wheel Limited.

Born in Montreal, August 1, 1926.

Was graduated from McGill University in 1950 with the degree of Bachelor of Engineering, having supplemented his studies by summertime foundry training at the Steel Foundry Division, Canadian Car & Foundry Company Limited (now known as Canadian Steel Foundries Limited).

Was first employed by C.S.F. as an engineer in the Plant Engineering Department. Then, in 1951, as Development Engineer, he co-ordinated the layout and installation of the new Product Machine Shop. On completion of the installation, was appointed to the position of Process Engineer. In 1954 was very active in the foundry modernization program.

In 1956 Mr. Jackalin was assigned to the duties of commencing the groundwork of Canadian Steel Wheel Limited. Duties consisted of co-ordinating and directing the building construction and equipment installation at the new plant. In 1958 was appointed Works Manager of Canadian Steel Wheel.

He is a member of the Corporation of Professional Engineers, American Society for Testing Materials, Engineering Institute of Canada, Association of Iron & Steel Engineering, and the Canadian Railway Club.

# # #

Frank Fathers,
Melting Superintendent,
Canadian Steel Wheel Limited.

Born in Winnipeg, Manitoba, November 8, 1926.

Educated at St. John's College and the University of Manitoba.

In September, 1947, was employed as Plant Metallurgist & Melting Superintendent by the Manitoba Steel Foundries. Accepted the position of Melting Superintendent at Premier Steel Mills Limited in August, 1955. In April, 1958, was employed by Canadian Steel Wheel Limited as Melting Superintendent. At C.S.W. Mr. Fathers served as co-ordinator of furnace installations.

He was Vice-Chairman of the Edmonton Chapter of the American Society of Metals in 1955, and is at present a member of A.S.M.

# # #

Allan Draper,
Technical Aid,
Canadian Steel Wheel Limited.
Chief Inspector,
Taylor Brothers & Company Limited.

Born in Manchester, England, March 18, 1924.

Studied metallurgy at the Manchester College of Technology and received the Associateship of Metallurgy from that institution.

In 1940 was employed by the National Gas and Oil Engine Co. Ltd. in the control laboratory of its foundry. In 1945 was employed as Junior Metallurgist in the Research Department of Magnesium Electron Limited, where he worked on pure research and development in alloying and casting techniques.

In 1948 he joined the research staff of Taylor Bros. & Co. Ltd., Manchester, England, and was appointed Chief Inspector in 1951. Mr. Draper is at present with Canadian Steel Wheel Limited to assist in further research investigations into the performance of wrought steel wheels.

He is an associate member of the Front Steel Institute, and a member of the Institute of Metals.

# # #

Story of Plant as biggest single user of electric power on the Island of Montreal.

Canadian Steel Wheel Limited will soon become the biggest single user of electric power on the Island of Montreal. Company officials have estimated that after the installation of their second 45-ton Electric Arc Melting Furnace, C.S.W. will be using over 60-million kilowatt hours of electricity per year.

According to Mr. E. J. White, General Manager of the Company, "here is an indication of the tremendous amount of power required to perform intricate industrial productive processes through automation. To utilize this power in our Plant, we have had installed fully 133 miles of electrical wire and cable."

No firm date for the installation of the second 45-ton furnace at Canadian Steel Wheel has been announced. However, all the foundation work necessary has already been completed.

# # #

TAYLOR BROS. PROVIDES RESEARCH AND TECHNICAL SERVICES

Taylor Bros. & Co. Ltd. are contributing their experience to the operations of C.S.W. The role of Taylor Bros. is to ensure that the high quality of the Taylor Rolled Steel Wheel -- now being produced by C.S.W. here -- is maintained.

Taylor Bros., of Manchester, England, is an associated company of English Steel Corporation, one of the two parent companies of Canadian Steel Wheel Limited.

Originators of the highly-mechanized type of wheel forging and rolling plant, Taylor Bros. have had over 100 years' experience in the manufacture of railway wheels.

The new C.S.W. Plant in Montreal was designed by Taylor Bros. in conjunction with their consulting engineers, Kendall Engineering, of Alliance, Ohio, who also worked with Taylor Bros. in the design of their plant at Trafford Park, Manchester.

# # #

C. S. F. Metallurgical Staff assists to ensure C. S. W. gets best steel

The close link which exists between C. S. W. and C. S. F. has been created to provide the wheel company with certain valuable services that Canadian Steel Foundries Limited is exceptionally well qualified to supply. Among the most important of these services are those which will be provided by C.S.F. metallurgical specialists. They are assisting on quality control tests, helping to ensure that only first grade steel will be used in the production of steel wheels.

The plants of the two companies are interconnected with each other and with a rail system. C.S.F. maintenance crews laid out this rail link and are responsible for its present operation. Other services provided by C.S.F. include, in part, or entirely - accounting, purchasing, medical, guard and fire-fighting personnel and equipment, industrial relations and a number of other related services.

\# # #

Details on major unit installations

ELECTRIC ARC MELTING FURNACES

Although two furnaces have been delivered, only one is at present in operation and the second will not be put into commission until justified by the demand for wheels.

The furnaces, which were supplied by Wild-Barfield, were manufactured in England to Italian designs. Each furnace has a shell diameter of 16 ft. and power is supplied by transformers rated at 17,500 K.V.A. each; 45 tons of metal is melted at each heat.

A unique feature of this furnace is that it is entirely hydraulically controlled and is also one of the highest rated furnaces for its size.

# # #

INGOT BREAKER

The Ingot Breaking Machine, which was manufactured by Canadian Vickers to the designs of Davy Bros., England, is a rugged machine weighing over 100 tons and is capable of breaking ingots up to 17" diameter.

The ingots are first lightly nicked with an acetylene torch at the required spacing to give a predetermined weight for each block from the ingot.

The ingots are broken by feeding them between three hardened steel anvils by means of an hydraulic ram. The two outer anvils are stationary, but the centre anvil, which is located opposite and midway between the two outer anvils, is fitted to a moving part of the machine known as the spectacle. This spectacle is driven by a 100 H.P. motor, through clutches and flywheel, to two massive gear wheels which rotate the crank to which the spectacle is fitted. The moving anvil contacts the ingot on the opposite side to the flame-cut nick and the tremendous shearing force set up by the inertia in the flywheel is sufficient to fracture the ingot. A clean and straight fracture is obtained.

The machine is capable of breaking 100 blocks an hour.

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ROTARY HEARTH FURNACE

The Rotary Hearth Furnace, which has an overall diameter of 60 ft., was designed to heat ingots from cold to a temperature of 2,330° F., with a capacity of 240 tons.

The furnace is fired by heavy fuel oil and, to ensure that the ingots are heated gradually and uniformly, the furnace combustion system is divided into five zones each automatically controlled from a central panel. An ejector type stack, fitted with automatically-controlled fan and damper, ensures that the correct pressure is maintained inside the furnace.

The hearth is supported on 64 cast steel wheels which rotate on 2 circular rails. A unique feature is the drive, which is actuated by electric motors driving through reduction gears to sprockets which mesh with a chain fitted to the outside periphery of the hearth. The hearth, which has a width of 10 ft., can accommodate a maximum of 348 ingots, each weighing from 700 to 2,000 pounds. Special controls on the Furnace Charging and Discharging mechanism permit the ingots to be placed on the hearth.

The number and location of ingots in the furnace is indicated on a dial, adjacent to the operator's control booth, which rotates in synchronism with the hearth.

# # #

HYDRAULIC DESCALER

When ingots or blocks are discharged from the Rotary Hearth Furnace they are coated with a thin layer of furnace scale which must be removed before they enter the first forging operation.

The Hydraulic Descaler was designed by Kendall Engineering of Alliance, Ohio, to meet the special conditions in the plant. It has a row of descaling-type jets, mounted to descale the top of the blocks, and similar nozzles arranged to descale the underside of the blocks. Water, at a pressure of 2,000 lbs. per sq. inch, is fed to the descaler and about 20 gallons of water is projected onto each block in 2.5 seconds in the form of thin knife-like streams.

The descaler is fully automatic in action and is actuated by the Furnace Discharging Machine as it carries each block from the furnace to the 6,000-ton Forging Press. Pneumatically-operated doors automatically close as the descaling action takes place, and open again to permit the discharger to pass through to the press.

# # #

6,000-TON FORGING PRESS

The 6,000-ton Hydraulic Forging Press, which was built by Canadian Vickers Limited in Montreal, was specially designed for high-speed forging of ingots into blanks suitable for rolling into railway wheels.

This press, which weighs well over 500 tons, receives its power from four 500 H.P. hydraulic pumps operating in conjunction with an air/water accumulator system at a maximum pressure of 4,250 lbs. sq./inch.

A unique feature of the press is that it is of the pull-down type, and although its overall height is in excess of 35 ft., only 15 ft. is visible above the floor. The press is fitted with an upper and lower sliding table which carry forming dies and an hydraulically-synchronized centering device for positioning the ingot accurately on the dies.

The press was designed to forge blanks at a rate of 80 per hour and, in order to obtain this output, extremely high speeds were required in the movement of the sliding tables and crosshead. To control this powerful press with the minimum of effort on the part of the operator, an electronic servo device was installed and the operator sits in an air-conditioned control booth in front of a desk and is able to operate the press with fingertip control.

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In the process of forging the ingot into a blank, the ingot is first slabbed down to a flat disc between the first set of dies, and is then gripped by the centering device to permit the sliding tables to bring the second operation dies under the press. These dies form the slab, at a pressure of 6,000 tons, into the rough shape of a wheel for finishing to the required profile in the Rolling Mill.

All the large hydraulic valves necessary for operation of the press are installed in a basement below floor level.

The center platen of the press weighs 98 tons and was one of the largest steel castings ever produced in Canada.

# # #

WHEEL PUNCHING PRESS

This press is a 1,000-ton upstroking hydraulic press built in Canada by Dominion Engineering Works, Limited, especially for C.S.W. It has an overall height of 24 feet, weighs approximately 70 tons, and is used to punch the hole in the wheel forging before it passes to the Wheel Rolling Mill. The Punch Press is designed to produce a net punching force of 800 tons with a hub clamping force of 200 tons. All hydraulic controls and about 50% of the press itself are mounted below floor level.

It is powered from the central shop accumulator system supplying treated water at a pressure of 4,250 pounds per square inch maximum. Operation is under control of a single operator from a station in the control room.

The press is of all-steel construction, except for the chilled iron rams and bronze guides. It was completely assembled, adjusted and tested in Dominion Engineering's shops, and shipped by rail as a single unit.

# # #

PUNCH PRESS OPERATING CYCLE

The wheel forging is carried into the Punch Press on a powered roller conveyor, and comes to rest against an adjustable and retractable stop arrangement, which holds the wheel in position.

The operator raises the moving crosshead on which is mounted the lower die holder and die, picking up the wheel from the conveyor and raising it rapidly until the hub contacts the clamping ram and hub clamping dies. Further upward movement clamps the wheel hub in the close-fitting dies with an effort of 200 tons preventing distortion during punching.

As the wheel is carried up further, the hub contacts a punch mounted rigidly in the top head of the press. The punch passes through the wheel and the slug drops out through the lower die holder. As the moving crosshead is lowered, the clamping ram strips the wheel from the punch, and the wheel then is lowered to the powered conveyor to travel under the wheel stop to the next operation. The stop is then lowered to position the next forging as it is received.

# # #

WHEEL ROLLING MILL

The Kendall-Taylor Wheel Rolling Mill was built by E. W. Bliss & Co. of Canton, Ohio, to the designs of Kendall Engineering and Taylor Bros., and is based on the design of the original mill in the works of Taylor Bros. & Co. Ltd., Manchester, England.

The mill is of the horizontal type and consists of two vertically-inclined edging rolls, each driven by a 400 H.P. motor, one main roll driven by a 150 H.P. motor, two pressure rolls and two guide rolls. All motions are operated by oil hydraulic systems and the mill is controlled by an operator from an air-conditioned control booth.

A feature of the mill is the electronically-controlled top screw-down mechanism, which enables the correct taper to be automatically obtained on the plate of the wheels.

When the forged blank arrives at the mill the hub and a part of the plate are already completed and the purpose of the mill is to roll out the forged blank to the required diameter and at the same time forge the rim and flange to the correct profile.

The mill is capable of handling wheels from 24" to 50" diameter and normal types of wheels can be rolled at a rate in excess of 60 an hour.

\# # #

WHEEL DISHING PRESS

The Dishing Press is a 3,000-ton double-acting hydraulic press, completely built in Canada by Dominion Engineering Works Limited for Canadian Steel Wheel Limited. This press has an overall height of 24 feet, a weight of approximately 110 tons, and is used to "dish" the wheel after the rolling operation.

This is the last forming operation on the hot forging prior to heat treating and cooling. It operates on treated water supplied by the plant accumulator system at a maximum pressure of 4,250 pounds per square inch maximum. The press is a down-stroking type with the moving crosshead supplying the rim clamping force of 1,000 tons through two 18" diameter side rams. The main dishing force of 2,000 tons is applied to the hub of the wheel through a central 36" diameter ram extending down through the moving crosshead.

A single operator controls all functions of the press, including the sliding table powered by a separate oil hydraulic system, from a station in the central control room.

# # #

DISHING PRESS OPERATING CYCLE

A wheel to be worked is placed on the dishing die mounted on the sliding table, and carried to the working position in the centre of the press. The wheel is clamped by the rim clamp exerting a force of 1,000 tons, which may at the same time straighten and size the rim. Pressure is then applied to the hub of the wheel by the central ram having a capacity of 2,000 tons. This offsets the hub to give the wheel its dished shape.

Further sizing and centering of the hub may also be accomplished in this operation. When the work is completed, a hook lifts the wheel clear of the die to permit the table to return for a new work piece. The finished wheel is deposited on the unloading stool and is moved out of the press as the next wheel is brought into position.

# # #

ISOTHERMAL ANNEALING TREATMENTS

To keep pace with the preceding modern, high-speed wheel-forming operations, the Canadian Steel Wheel Limited engineers specified continuous and practically automatic annealing, hardening and tempering furnaces to obtain uniformly-high metal qualities in both freight and passenger car wheels.

Investigations of the Company metallurgists, mechanical engineers and consultants in Great Britain, the United States and Canada resulted in a specification to meet the requirements of almost complete automation, high quality of treatment and yet extreme flexibility of operation to suit production cycles.

The Canadian General Electric Company was selected to design, build and install the three treatment furnaces. During the design period, very close liaison was maintained between the engineers and consultants of Canadian Steel Wheel Limited and the Canadian General Electric Company engineers. Particular assistance was rendered by the burner and combustion suppliers, the Bloom Engineering Company of Pittsburgh, the Industrial Division of the Honeywell Company in Toronto and by the hydraulic component suppliers, the Vickers Sperry Company at Toronto.

Heat Treatments

To refine the forged steel wheels, it is necessary in all cases to slowly control the cooling rate of each wheel to:

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(a) permit hydrogen diffusion during the slow cool;

(b) stress-relieve the wheel sections;

(c) equalize temperature in the hub, plate, rim and flange.

However, a percentage of wheels, in addition to the above treatment must be re-heated, rim-quenched in special quench mills and re-heated to be tempered uniformly in one of the continuous furnaces.

To obtain maximum productivity without sacrifice of treatment quality, extreme flexibility of furnace operation is required. Thus, each furnace is designed to operate continuously on at least two different treatment cycles as selected by the control operator.

Furnace Layout

Three continuously-operated oil- or gas-fired tunnel car furnaces are required to meet the production requirements. Each tunnel furnace will contain ten wheel-supporting load cars. Each load car may carry up to 24 stacked railway car wheels, an approximate weight of 13 tons per car.

The cars are progressively pushed by hydraulic cylinders through each furnace in cycles. The cars are automatically transferred from one furnace to the next furnace in the cycle by hydraulically driven transfer bogies. The bogies automatically start and stop at transfer points by a centrally-located push button control. Once the bogie is located, the load cars are automatically transferred by hydraulic mechanisms to the bogie car.

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All doors are hydraulically controlled and automatically sequenced into the master cycle control. In all, to move doors and cars, some 30 hydraulic cylinders are controlled by a single operator control.

At the completion of the cycle, the load cars are automatically transferred by rail track to the machine shop for cleaning and final finishing.

The physical space required for the three treatment furnaces, the car transfer systems and the hydraulic cylinder push-pull mechanisms, is less than 10,000 square feet.

Process Quality Controls

Each furnace is equipped with controlled cooling and controlled heating zones to insure the equalization of temperature and stress removal between the heavy hubs and rims and the lighter plate sections.

This control quality is ensured by separate chamber modulating air coolers and air heaters and by the use of tempered flame burners throughout the furnaces.

Extremely large volume high-temperature fans are used to re-circulate the furnace atmosphere, forcing heat transfer equalization between the heavy and light sections of the wheels. Special ductwork, as well as large volumes of air transfer are used to insure heat equalization.

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Each furnace is equipped with seven or more zones of control to provide accurate cycle control. Control thermocouples and test thermocouples are provided throughout the 90-foot length of each furnace.

All temperature controls are of the controlling instrument type and are housed in a glass-fronted duct and heatproof enclosure adjacent to the furnace control console. A recording controller is supplied for each furnace.

Automation Sequences

The entire operation of all three furnaces, the twelve individual furnace doors, the two transfer bogie cars, 34 load cars and over 30 hydraulic drives are controlled by one operator.

This operator, located in an overhead glass-enclosed console station, has push button control of all furnace movements. Signal lights indicate the control of sequence points and the relationship of cars, loads and doors.

Closed circuit TV between camera and receiver is installed in the console station, so that the operator may scan the rear furnace area, which is 70 ft. wide and some 135 feet away. This is believed to be the first closed circuit television camera installed for furnace control in Canada.

Control of temperature and fuel firing in the three furnaces is set at the beginning of a treatment cycle and automatically

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controlled and recorded during the cycle. The console operator can observe the heat control settings from his console station.

The installation of the three treatment furnaces with the complex hydraulic drive and push-pull mechanisms for sequence cycles, and the close temperature control afforded by re-circulation of heated or cooled air with tempered flame burners, all combine to provide a degree of quality control and automation heretofore unknown in the wheel treatment industry.

# # #

WHEELABRATOR SHOT BLASTING UNIT

This unit has been designed for shot blasting wheels varying in size from 33" to 42" in tread diameter.

The machine is equipped with three wheelabrator units which rotate at 2,250 R.P.M. and throw the shot onto the wheels. These units are mounted on the side and top of the cabinet and clean both the front and back faces and tread of the wheels as they are rotated on the spinner rolls.

The wheels are loaded and unloaded by separate air cylinder operating devices, which automatically admit the wheels into the blast chamber and eject the clean wheels.

The blast completely removes all mill and heat treatment scale, and is capable of cleaning wheels at the rate of 60 an hour.

# # #

AUTOMATICALLY-CONTROLLED HANDLING EQUIPMENT

All the automatic handling equipment was designed by Kendall Engineering of Alliance, Ohio, to meet the special requirements of this plant.

All equipment is actuated by oil hydraulic systems and associated automatic electric control systems, and all the operator has to do is to flick a switch to initiate the sequence cycles.

The Furnace Charging Machine automatically picks up a block from a conveyor and places it accurately in a predetermined position in the furnace hearth. The furnace door opens and either four, five or six blocks are placed across the hearth until the row is full and the door then closes. The furnace hearth indexes to bring an empty row in front of the charger and the cycle commences again.

The Furnace Discharging Machine automatically picks a block off the hearth at the discharge door and rotates 90° through the Hydraulic Descaler and deposits the block on the slabbing die of the 6,000-ton Forging Press.

One operator is at the controls of these two machines and the furnace.

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Other special machines load and unload the Wheel Mill and also take wheels from the Coning Press, turn the wheels over and elevate them to a conveyor which carries them through a Stamping Press and Inspection Unit.

# # #

HIGH-PRODUCTION WHEEL TURNING LATHE

The lathe was specially designed and manufactured by Morey Machinery, of New York, to meet the requirements of Canadian Steel Wheel Limited.

It is driven by a 150 H.P. motor coupled to a generator and is designed to machine the rim and tread profile, and hub and rim faces, at a rate of 20 wheels per hour.

Operation is fully automatic and metal is removed by eight cutting tools fitted in six compounded slides. An automatic loading-device loads and unloads wheels from the lathe.

The lathe is extremely rugged and is fitted with the latest devices for control of the automatic profile-machining of the wheel rim.

The weight of the lathe is in excess of 100 tons.

# # #

HIGH-PRODUCTION WHEEL BORING AND FACING UNIT

This unit was specially designed and manufactured by Kearney and Trecker Corp., of Milwaukee, for boring and facing railway wheels automatically at a rate of 40 an hour.

The unit consists of a boring station and a facing station, each driven by a 125 H.P. motor and interconnected by a wheel transfer system, which automatically moves wheels through the stations at the completion of each cycle.

A unique type of loading mechanism feeds wheels into the wheel transfer system, and delays due to loading the units are eliminated.

The complete machining and transfer operation is controlled by one operator from a central control panel.

Rapid metal removal is a feature of this extremely rugged unit. The dividing of operations permits each machine to be relatively simple in design and maintenance is, accordingly, made much easier.

# # #

MAGNAFLUX INSPECTION UNIT

This unit has been specifically designed for the magnetic particle inspection of railroad wheels ranging in tread diameter from 28" to 42" and is the first of its kind in Canada. The unit features a 5,000-amp. D.C. Duovec power pack, which will disclose to the inspector defects lying in either a radial or circumferential direction at one inspection.

In order to ensure proper flux distribution, two magnetizing coils are used, one at either wheel face. Once loaded into the magnetizing station, the wheel is automatically rotated while properly sequenced spray and magnetizing "shots" are applied.

The coils, mentioned above, feature the induced current method of magnetization. They are built around an iron laminated core which is a necessary part of the method. The coils serve to disclose defects lying in a direction paralleling the tread path. A central conductor, which is mounted to the laminated core, will show up defects lying in a radial direction.

The unit is capable of handling 30 wheels per hour. All the operations are made automatically and the defects are observed by using ultra-violet light, which causes the defects to be fluorescent.

# # #

Facts about Sales and Service

Sales Office

All sales and distribution will be directed by Canadian Steel Wheel Limited, from its Plant Office at 1900 Dickson Street, Montreal 5, Canada.

Service Representatives

The Holden Co. Ltd. of Moncton, Montreal, Toronto, Windsor and Winnipeg, has been appointed as C.S.W. Service Representatives. The Holden Company has been an important distributor in the railway field for over 50 years, and has had many years' experience in sales and servicing of wrought steel wheels manufactured by Taylor Bros. & Co. Ltd., Manchester, England.

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